

REMARKS

Favorable consideration of the application is respectfully requested. Claims 25-31, 33-38, 40-41, 43, 50-54 and 56, prior to this paper, were pending in the present application and claims 32, 39, 42, 44-49 and 55 were withdrawn from consideration.

By this paper, claims 25, 34, 40, and 50 are amended.

Claim Rejections - 35 U.S.C. §102

Claims 50-54 and 56, prior to amendment, were rejected under 35 U.S.C. §102(b) as being anticipated by Sasaki (U.S. Patent No. 4,471,525).

Base claim 50 has been amended to recite:

“...forming an insulative material in said trench at least partially by substantially consuming said semiconductive spacer and said single layer dielectric lining to substantially fill said trench with said insulative material without forming a diffusion region at the base of said trench.”

The amended language further distinguishes the presently claimed invention from Sasaki. Support for the language “forming an insulative material in said trench...to substantially fill said trench with said insulative material without forming a diffusion region at the base of said trench” is found in Figs. 1F-1H and 2E-2I, of the present specification, as these drawings demonstrate the absence of bordering diffusion region at the base of the trench. The term “diffusion region” is defined and supported in the specification on page 9, lines 1-3. In fact, the presence of a diffusion region at the base of the isolation trench of the present invention could be detrimental to the intent of the present invention, namely creating isolation between conductively doped regions of active devices on a semiconductor assembly.

Sasaki discloses in Figs. 4D-4H that a p⁺ diffusion region 50 is formed to border the base trench 47. Sasaki, on column 9, lines 53-55, discloses the formation of a p⁺ type channel stopper 50 by diffused boron. In fact, in all the embodiments of Sasaki, a p⁺ channel stopper is formed to border the base of the created trench.

In contrast to Sasaki, the present invention, as currently amended, forms device isolation by substantially filling a trench with insulation material without forming a diffusion region at the base of the base. Once the trench is substantially filled with insulation material the formation of a diffusion region would be prohibited, as a conductive implant would have to travel through the insulation material. Clearly, Sasaki cannot anticipate the presently claimed invention as the p⁺ diffusion region 50 formed to border the base of trench 47, must take place prior to the formation of the insulation in trench 47, whereas the present invention forms the insulation filled trench without forming a diffusion region at the base of the trench and thus prevents the formation of a subsequent diffusion region.

Clearly, Sasaki teaches away from the present claimed invention of “forming an insulative material in said trench at least partially by substantially consuming said semiconductive spacer and said single layer dielectric lining to substantially fill said trench with said insulative material without forming a diffusion region at the base of said trench,” a feature of the presently claimed invention as relied on for amendment.

Thus, claim 50, as presently amended, is patentable over the art of record and thus place dependent claims 51-54 and 56 as patentable over the art of record as well. Therefore, by amendment, the rejection of claims 50-54 and 56, under 35 U.S.C. §102(b), as being anticipated by Sasaki, is overcome.

Claim Rejections - 35 U.S.C. §103

Claims 25-31, 33-38, 40-41 and 43, prior to amendment, were rejected under 35 U.S.C. §103(a) as being as being unpatentable over Sasaki in view of Kameyama (U.S. Patent No. 4,472,240).

Base claims 25 and 34 have been amended to recite:

“...forming an insulative material in said first and second trenches at least partially by substantially consuming said semiconductive spacer and said single layer dielectric lining during formation to substantially fill said first and second trenches with said insulative material without forming a diffusion at the base of said second trench;”

Base claim 40 has been amended to recite:

“...forming an oxide filler in said first and second trenches at least partially by substantially consuming said silicon spacer and said oxide layer to substantially fill said first and second trenches with said oxide filler without forming a diffusion region at the base of said second trench;”

language, which further distinguishes the presently claimed invention from Sasaki in view of Kameyama.

Support for the language “...forming an insulative material in said first and second trenches at least partially by substantially consuming said spacer and said single layer dielectric lining to substantially fill said first and second trenches with said insulative material without forming a diffusion region at the base of said second trench” is found in Figs. 1F-1H and 2E-2I, as these drawings demonstrate the absence of bordering diffusion region at the base of the trench. The term “diffusion region” is defined and supported in the specification on page 9, lines 1-3. In

fact, the presence of a diffusion region at the base of the isolation trench of the present invention would be detrimental to the intent of the present invention, namely creating isolation between devices of a semiconductor assembly.

As discussed earlier, Sasaki discloses in Figs. 4D-4H that a p⁺ diffusion region 50 is formed to border the base trench 47. Sasaki, on column 9, lines 53-55, discloses the formation of a p⁺ type channel stopper 50 by diffused boron. In fact, in all the embodiments of Sasaki, a p⁺ channel stopper is formed to border the base of the created trench.

Kameyama discloses the formation of first and second trenches and filling these trenches with an oxide filler. If the Examiner is correct in that Sasaki and Kameyama are combinable, in light of the presently claimed invention this combination would defeat the intent of Sasaki. If a second trench of Kameyama was implemented in any of the embodiments of Sasaki, either the p⁺ channel stopper formed to border the base of the created trench would be destroyed or the p⁺ channel stopper would be placed after the second trench is formed and thus resulting in the formation of a p⁺ channel stopper bordering the base of the created trench. Clearly, either scenario teaches away from the presently claimed invention.

In contrast to Sasaki in view of Kameyama, the present invention, as currently amended, forms device isolation by substantially filling a trench with insulation material without forming a diffusion region at the base of the base. Once the trench is substantially filled with insulation material the formation of a diffusion region would be prohibited, as a conductive implant would have to travel through the insulation material.

Clearly, Sasaki in view of Kameyama, does not anticipate the presently claimed invention as the p⁺ diffusion region 50 formed to border the base of trench 47 in Sasaki, must take place prior to the formation of the insulation in trench 47 and the addition of a second trench in Kameyama would either destroy the p⁺ channel stopper formed to border the base of the created trench or the p⁺ channel stopper would be placed after the second trench is formed and thus resulting in the formation of a p⁺ channel stopper bordering the base of the created trench,

whereas the present invention forms the insulation filled trench without forming a diffusion region at the base of the trench and thus prevents the formation of a subsequent diffusion region.

Clearly, Sasaki teaches away from the present claimed invention of forming a trench into a semiconductor substrate, said semiconductor substrate being devoid of a bordering diffusion region at the base of said trench, a feature of the presently claimed invention as relied on for amendment.

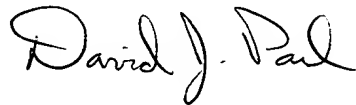
Thus, base claims 25, 34 and 40, as presently amended, are patentable over the art of record and thus place respective dependent claims 26-31, 33, 35-38, 41 and 43 and as patentable over the art of record as well. Therefore, by amendment, the rejection of claims 25-31, 33-38, 40-41 and 43, under 35 U.S.C. §103(a) as being as being unpatentable over Sasaki in view of Kameyama (U.S. Patent No. 4,472,240), is overcome.

CONCLUSION

Applicant submits that the application is in condition for allowance. Such allowance at an early date is respectfully requested.

To that end, if the Examiner feels that a conference will expedite the prosecution of this case, the Examiner is cordially invited to call the undersigned.

Respectfully submitted,

A handwritten signature in cursive script that reads "David J. Paul".

David J. Paul
Agent for the Applicant
Registration Number 34,692
(208) 368-4515

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